CERTIFICATE

The attached is a true English language translation of the Chinese patent application No. 02 2 58539.7 filed November 19, 2002.

CLAIMS

1. A side handle with a laser alignment device provide for drills (41), comprising:
   a hand grip (1);
   an open ring (2);
   a locking means (3);
   said side handle (41) further comprising a first laser generator (6) to project a fanned laser beam (64) in alignment with the plane where the central axis (412) of the open ring (2) is in. Said side handle (41) also comprising a battery pack (8) for powering the first laser generator (6) and a switch (7) to activate or shut down the laser generator (6) independently.
2. The side handle (41) of claim 1, comprising at least one of the three level bubbles (91、92、93), wherein two of which (91、92) are parallel and vertical to the fanned laser beam (64) projected by said first laser generator(6) respectively, and the other one (93) positions to the fanned laser beam (64) with the angular degree as required, 45 degrees is preferential.
3. The side handle (41) of claim 1 or 2, comprising a sub handle (42) provided with a second laser generator (6'), which can project a fanned laser beam (64') to align with the central axis (412) of the open ring (2). Said sub handle (42) and side handle (41) is secured to make the first and second laser beam projected by the first and second laser generator (6, 6') vertical to each other.
4. The side handle (41) of claim 3, wherein the angular degree between said sub handle (42) and side handle (41) is adjustable. The scope of the adjustment preferred to allow the angular degree of the two fanned planar laser beam (64, 64') be adjustable from 45 to 180 degrees.
5. The side handle (41) of claim 3, wherein said sub handle (42) is provided with at least one of the two level bubbles (91', 92'), which are parallel and vertical to the fanned laser beam (64') project by the second laser generator (6').
6. The side handle (41) of claim 4, wherein said sub handle (42) is provided with at least one of the two level bubbles (91', 92'), which are parallel and vertical to the fanned laser beam (64') project by the second laser generator(6').
7. The side handle (41) of claim 5, wherein said sub handle (42) is provided with a universal joint (422), with which, the sub handle (42) can rotate about its central axis (421) of 180 degrees or lean backwardly with an elevation angle of 0 to 90 degrees.
8. The side handle (41) of claim 6, wherein said sub handle (42) is provided with a universal joint (422), with which, the sub handle (42) can rotate about its central axis (421) of 180 degrees or lean backwardly with an elevation angle of 0 to 90 degrees.

DESCRIPTION

AUXILIARY HANDLE WITH A LASER ALIGNMENT DEVICE FOR DRILLS

FIELD OF THE INVENTION

The present invention relates to an auxiliary handle with a laser alignment device which can be provided for electric hammer, drill or hammer drill which are powered by alternating current or direct current. The operator only need to align the laser beam projected by the laser generator of the auxiliary handle with the confirmed reference point or line in order to position the drill holes quickly and accurately.

BACKGROUND OF THE INVENTION

The prior auxiliary handles of drill tools are merely used for grasping; there are no devices on the drill to assist the user to determine the position of the hole to be drilled. When the user needs to drill a hole or a series of holes in reference to some objects, he has to manually mark the points for drilling on the surface of an object to be drilled by a ruler and a pen, and possibly even need the aid of a horizontal or vertical indicator, before he can begin to work. Moreover, if the reference objects are far away, it is difficult to attain the alignment with precision.

SUMMARY OF THE INVENTION

It is an objective of the present invention to provide an improved auxiliary handle with a laser alignment device provided for drills. Typical drills in the prior art have a cylindrical shoulder which can be engaged with the collar of an auxiliary handle. Generally, the outside diameter of the cylindrical shoulder is of standard dimension. The inner diameter of the opened collar of the auxiliary handle can be adjusted by a clamp means to accommodate the shoulder portion. Thus, when the clamp means is loosened, the circumference of the collar will enlarge, and the auxiliary handle can be rotated around or detached from the shoulder of the drill; and, when the clamp means is closed or clamped, the auxiliary handle can then be clamped on the drill shoulder, so that it is convenient to position the auxiliary handle in any desired angular orientations for comfortable grasping when drilling in different positions.

It is another object of this invention to provide an auxiliary handle with a laser alignment device, without decreasing the original function of the auxiliary handle. The laser alignment device can project a fanned planar laser beam through an aperture and form a visible line on the surface of the object to be drilled. Since the auxiliary handle can rotate around the shoulder of the drill, when the operator wants to drill a hole or a series of holes in reference to two points, a line or a plane, he just needs to rotate and secure the auxiliary handle on the drill to align the laser line with the referenced points, line or plane, thus enabling the user to drill holes in the desired position directly and accurately.

Specifically, the auxiliary handle with a laser alignment device of the present invention comprises a grip portion for grasping, an opened collar, a clamp means which preferably can be a pair of bolts and nuts for clamping or loosening the opened collar. The auxiliary handle of this invention further comprises a first laser generator, a battery pack to power the first laser generator device, and a switch to control the first laser generator. The laser generator may comprise a

housing, a laser diode, lens assembly to focus and fan the light projected by the laser diode into a fanned planar beam. Finally, there is an elongated aperture on the front of the housing wherefrom the light projects, and which is in alignment with the plane of the fanned beam. When the auxiliary handle is clamped on a drill, and the control switch is turned on, the laser generator will project a fanned beam through the aperture forwardly. The plane of the laser beam is parallel to the central axis of the auxiliary handle, and is in the same plane with the major axis of the drill chuck. Considering that some users may be left-handed, it would be preferable that the central axis of the auxiliary handle is aligned with the major axis of the drill chuck such that the laser beam is also aligned with the central axis of the auxiliary handle.

Another object of this invention is to provide a more precise point to be drilled. When it is necessary to drill a hole or a series of holes exactly horizontally, vertically or 45 degrees aligned to a reference object such as a point, a line or a plane, the auxiliary handle can be selectively mounted with one or more level bubbles, which are respectively horizontal, vertical or 45 degrees to the fanned laser beam. Referring to the line on the work piece projected by the laser alignment device, with the aid of the bubbles mounted on the auxiliary handle which are respectively horizontal, vertical or 45 degrees to the laser beam, this auxiliary handle can provide a leveled horizontal line or a plumb line or a 45 degree line reference to the horizontal plane through the referenced object.

A further object of the present invention is to provide an auxiliary drill handle can generate two reference points or lines at the same time. Accordingly, in the present invention, the opened collar of the auxiliary handle may have a sub-handle. A second laser generator which is similar to the first one is mounted on said sub-handle, and it can also be powered by the common battery pack described above and controlled by the same switch in common for the first laser generator. The center axis of the sub-handle can pass through the center of the drill chuck. The second laser generator projects a fanned beam forwardly, which is parallel to the center axis of the sub-handle or within a common plane with the center axis of the sub-handle. Meanwhile, the laser beam projected by the second laser generator has a common plane with the center axis of the drill chuck. Thus, the two fanned beams projected by the first laser generator on the auxiliary handle and the second laser generator on the sub-handle form two lines on the surface of the object to be drilled, and form an intersection point which laps over the center axis of the drill chuck, i.e. the drill bit. The degree of the angle formed by the two laser lines is determined by the angle between the sub-handle and the auxiliary handle. The sub-handle can also be fixed on the auxiliary handle with their axis perpendicular to each other. Thus, the degree of the angle formed by the sub-handle and the auxiliary handle can be adjusted within a range as required for practical use. The adjustable range is preferably from 45 to 180 degrees, and some scale marks on the opened collar adjacent to the sub-handle with 45, 90, 135 or 180 degrees reference to the plane of the first laser planar beam projected by the first laser generator. In this way, a hole position for drilling can be determined in reference to any two points by adjusting the auxiliary handle around the shoulder of the drill and adjusting the sub-handle around the collar of the auxiliary handle.

One or more level bubbles can also be mounted on the sub-handle to indicate the relative position of the laser beam projected by the second laser generator as in horizontal, vertical or 45 degrees reference to horizontal plane. Thus, with the aid of the level bubbles of different position on the auxiliary handle and sub-handle, it is possible to position a hole on a non-level surface more accurately by horizontally, vertically or at 45 degrees referencing to a reference point.

An even further object of the present invention is to provide a sub-handle wherein the laser generator projects a laser beam backward to the drill. Thereby, the operator can take the target behind his or her back as basic reference during the work.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates a front view of a preferred embodiment of an auxiliary drill handle with a laser alignment device;

FIG. 2 is a right side view of the auxiliary drill handle shown in FIG. 1;

FIG. 2A is a preferred embodiment of the laser generator;

FIG. 3 is a rear view of the auxiliary handle with a laser alignment device;

FIG. 4 is a perspective view of the auxiliary handle with a laser alignment device as shown in FIG. 1 installed on a drill;

FIG. 5 is a front view of the auxiliary handle with a laser alignment device with a sub-handle mounted thereto;

FIG. 6 is a right side view of the auxiliary handle with a laser alignment device shown in FIG. 5;

FIG. 7 is a rear view of the auxiliary handle with a laser alignment device as shown in FIG. 5;

FIG. 8 is a perspective view of a drill with a sub-handle perpendicular to the auxiliary handle;

FIG. 9 is a perspective view of a drill with a sub-handle aligned with the auxiliary handle;

FIG. 10 is a front perspective view with the auxiliary handle shown in FIG. 8 turned approximately 90 degrees;

FIG. 11 is a rear perspective view when the laser generator of the sub-handle projects a laser beam backward to the drill; and

FIG. 12 is a perspective view with the sub-handle tilted backward.

DETAILED DESCRIPTION OF THE PREFERRED EMBOCIMENT

Referring to FIGS.1-4, the auxiliary handle 41 of the present invention can be mounted on a drill 101 to position a reference point or a series of reference points on a work surface. The auxiliary handle 41 comprises a handle portion 1 for grasping, an opened collar 2 for mounting the handle 41 to a shoulder of the drill 101, and a clamp means 3 for locking or loosening the opened collar 2. The auxiliary handle 41 further comprises a first laser generator 6 positioned in the front face 412 of the auxiliary handle 41, a switch 7 used to turn on or turn off the first laser generator 6, a battery pack 8 to power the first laser generator 6, and clamp means 3 may comprise a bolt 31 and a nut 32. For the convenience of a left-handed person, it is preferable that the center axis 411 of the auxiliary handle 41 can be in a common plane with the drilling axis 412' of the opened collar 2 when the opened collar 2 is secured to drill 101. In this manner, the center axis 411 is also in a common plane with drilling axis 103 of chuck 102 of drill 101. The auxiliary handle 41 can be detached from the drill 101 or rotated around drill 101 when the clamp means 3 is loosened (via bolt 31 and nut 32), and be secured on the shoulder of drill 101 when the clamp means 3 is tightened (via bolt 31 and nut 32).

As shown in FIG. 2A, the laser generator 6 comprises a housing 65, a laser diode 61, a set of lens 63 which first focuses the divergent light projected by laser diode 61 and then transforms the

focused light to a fanned planar beam 64, and an elongate aperture 66 on the front of housing 65 through which laser beam 64 projects out. The fanned planar beam 64 travels through drilling axis 103 of drill chuck 102, as shown in FIG.4, and forms a line 641 on surface 202 of work piece 201, such that the operator can drill a hole at any position of line 641 aligned to any reference point A1 at line 641.

A level bubble (or a plurality of level bubbles) can be mounted on the back 413 of auxiliary handle 41 shown in FIG.1, i.e. mounted on the plane face to the operator when handle 41 is being installed on drill 101. The bubble can be parallel, vertical or 45 degrees to fanned planar beam 64, such as level bubbles 91, 92 and 93 shown in FIG.3. The manufacture can select to mount only one or two of the bubbles 91, 92, 93 on the auxiliary handle 41, or mount three bubbles. FIG.3 is the rear view of an auxiliary handle 41 with all three level bubbles 91, 92 and 93 being mounted on its back 413. When it is required to drill a hole on a vertical wall, the operator needs only to adjust drill 101 or auxiliary handle 41 by corresponding level bubbles, that is, to adjust laser line 641 on the wall, and accurately position a hole vertically, horizontally or by 45 degrees aligned to a reference point.

Referring to FIG.5, auxiliary handle 41 can also include a sub-handle 42, whose central axis 421 is perpendicular to central axis 411 of auxiliary handle 41. Central axis 421 may intersect central axis 412' of opened collar 2. Sub-handle 42 comprises a second laser generator 6' which is similar to the first laser generator 6. Second laser generator 6' may also be powered by battery pack 8, and controlled by switch 7 on auxiliary handle 6. Fanned beam 64' projected by second laser generator 6' travels through central axis 103 of drill chuck 102. Thus, two fanned planar beams 64, 64' projected by the first and second laser generator 6, 6' on the relevant auxiliary handle 41 and sub-handle 42 form two lines 641, 642 which are perpendicular to each other on surface 202 of work piece 201, and the intersection point formed by the two lines lap over drill bit 104 as shown in FIG.8.

It is preferred that the angle formed by sub-handle 42 and auxiliary handle 41 may be adjustable, as shown in FIG.6, the manner to fix the sub-handle on opened collar 2 of auxiliary handle 41 may be a curved notch 21 on the outer circumference of collar 2. Thus, the angle formed by two central axis 411, 421 can be adjusted as required. It is preferred that sub-handle 42 may be adjusted relative to auxiliary handle 41 such that the angle is from 90 to 180 degrees, or any angle therebetween. In a preferred embodiment, collar 2 may be marked with some scale marks wherein it is 90, 135 or 180 degrees relative to fanned beam 64 projected by first laser generator 6.

As shown in FIG.7, two level bubbles 91',92' which are horizontal and vertical to the laser beam 64'can be mounted on sub-handle 42 individually or together, respectively to indicate the position of laser line 642 relative to the horizontal plane.

By combination of different bubbles on the auxiliary handle 41 and sub-handle 42, it is possible to position a reference point or a series of reference points along a line on a non-horizontal surface more accurately at a line which is horizontally, vertically or 45 degrees aligned to a reference point.

Referring to FIG.4, by turning on switch 7 on auxiliary handle 41, laser generator 6 will project a fanned planar laser beam 64 which travels through the central axis 103 of chuck 102 of drill 101 and forms a line 641 on surface 202. One can obtain an exact plumb laser line 641 by rotating auxiliary handle 41 to approximately make laser beam 64 vertical, then level with bubble

92. Then, the operator can drill a hole or a series of holes along line 641 on which reference point A1 is positioned.

Similarly, the user can rotate auxiliary handle 41 around drill 101 to a position convenient for grasping, and adjust the laser beam 64 to an approximately horizontal plane, and then level auxiliary handle 41 with bubble 91 to obtain an exact horizontal line 641.

When the reference object is a line itself, the user only need to align the laser beam to the reference line, and then position the chuck 102 of the drill 101 at a point along the laser beam to drill a hole accurately.

Similarly, the level bubbles can be mounted on the auxiliary handle with other degrees relative to the center axis of the auxiliary handle to obtain different positioning lines.

Referring to FIG. 8, when sub-handle 42 is perpendicular to the auxiliary handle 41, laser lines 641, 642 projected by first and second laser generator 6, 6' can be aligned to first and second references A1, A2 respectively. By leveling the auxiliary handle 41 to make laser line 641 horizontal and laser line 642 vertical, the user can then drill at the intersection point of laser lines 641, 642. Referring to FIGS.9 and 10, sub-handle 42 can be adjustable around the auxiliary handle 41, which can also be adjusted relative to drill 101, so the user can position a drill hole with different references.

Referring to FIG.11, sub-handle 42 can also be designed so that it can be detached from and then mounted reversely on auxiliary handle 41 to make laser generator 6' turn 180 degrees backward. Or, it can be supplied with a universal joint, not shown in the figure, to enable sub-handle 42 to rotate about the central axis of itself of 180 degrees. In another embodiment, as best illustrated in FIG.12, sub-handle 42 can be constructed so that it can lean backward to extend the projection distance of the laser beam. When the elevation angle reaches 90 degrees, sub-handle 42 will be parallel to central axis 103 of chuck 102. When the reference point or line is not on the same surface to be drilled, or is too far away from the hole to be attached by the laser beam, first secure sub-handle 42 on auxiliary handle 41 with a confirmed angle α when they are in the same plane, and then tilt sub-handle 42 backward as desired. For instance, when it is required to drill a hole on a vertical wall, the operator may take one point on this wall as one reference point, adjust sub-handle 42, and then to position a hole referencing a second point, which is on the other wall, ceiling or floor as desired.

While some exemplary embodiments have been disclosed herein, it will be understood by those skilled in the art that the present invention is not limited to the examples discussed above, but may be changed or modified without departing from the spirit or scope of the invention. To mount another one or more sub-handles with the laser generator on the auxiliary handle, as an example, is within the scope of the invention.

CERTIFICATE

The attachment of this certificate is a true copy of the following patent application that is filed with the Office.

Filing date:	November 19, 2002
Application Number:	02 2 58539.7
Kind of the application:	Utility Model
Title of the Design:	Auxiliary Handle with a Laser Alignment Device for Drills
Applicant:	Chervon International Trading Co., Ltd
Inventor or Designer:	Shuming WU

Commissioner of the State Intellectual Property Office **Jingchuan WANG**

The People's Republic of China

October 22, 2003

证　　明

本证明之附件是向本局提交的下列专利申请副本

申　请　日：　2002 11 19

申　请　号：　02 2 58539.7

申请类别：　实用新型

发明创造名称：　用在钻类工具上的带激光定位标尺的副把手

申　请　人：　南京泉峰国际贸易有限公司

发明人或设计人：吴书明

中华人民共和国
国家知识产权局局长　王景川

2003 年 10 月 22 日

权 利 要 求 书

1、一种可装在各种钻类工具上的带激光定位标尺的副把手(41)，包括一握持手柄(1)，一开口环(2)，一锁紧装置(3)，其特征在于：所述副把手(41)上还装有一第一激光发生器(6)，所述第一激光发生器(6) 发出的扇面光束(64)与开口环(2)的中心轴线(412)在一个平面内，所述副把手(41)上还装有一电池组(8)作为第一激光发生器(6)的电源和一开关(7)用于独立控制激光发生器(6)的开启与关闭。

2．如权利要求 1 所述的带激光定位标尺的副把手(41)，其特征在于：在所述副把手(41)上装有三个水平泡(91、92、93)中的至少一个，其中水平泡(91)和水平泡(92)分别平行和垂直于所述第一激光发生器(6)发出的扇面光束(64)，水平泡(93)与所述扇面光束(64)间的角度可根据需要而定，最好为 45 度。

3．如权利要求 1 或 2 所述的带激光定位标尺的副把手(41)，其特征在于：所述副把手(41)上还有一个带一第二激光发生器(6')的子把手(42)，所述第二激光发生器(6') 发出的扇面光束(64')与开口环(2)的中心轴线(412)在一个平面内，所述子把手(42)与副把手(41)之间的角度确保第一和第二激光发生器(6,6')发出的扇面光束相互垂直。

4．如权利要求 3 所述的带激光定位标尺的副把手(41)，其特征在于：所述子把手(42)与副把手(41)之间的角度可调节，调节范围最好使得所述两扇面光束(64,64')之间的角度在 45 度到 180 度之间。

5．如权利要求 3 所述的带激光定位标尺的副把手(41)，其特征在于：所

述子把手(42)上装有二个水平泡(91'、92')中的至少一个，其中水平泡(91')和水平泡(92')分别平行和垂直于所述第二激光发生器(6')发出的扇面光束(64')。

6．如权利要求 4 所述的带激光定位标尺的副把手(41)，其特征在于：所述子把手(42)上装有二个水平泡(91'、92')中的至少一个，其中水平泡(91')和水平泡(92')分别平行和垂直于所述第二激光发生器(6')发出的扇面光束(64')。

7．如权利要求 5 所述的带激光定位标尺的副把手(41)，其特征在于：所述子把手(42)上还有一个万向节(422)，利用所述万向节(422)，子把手(42)可以绕其中心轴线(421)旋转 180 度，还可以向后仰，仰角范围为 0 至 90 度。

8．如权利要求 6 所述的带激光定位标尺的副把手(41)，其特征在于：所述子把手(42)上还有一个万向节(422)，利用所述万向节(422)，子把手(42)可以绕其中心轴线(421)旋转 180 度，还可以向后仰，仰角范围为 0 至 90 度。

用在钻类工具上的带激光定位标尺的副把手

技术领域

本实用新型涉及一种用于交、直流电钻、冲击钻、电锤等工具上的带激光定位标尺的副把手。操作者利用该把手上的激光发生器发出的激光束可以以确定的参照点或线迅速准确地定位钻孔点。

背景技术

目前的钻类工具所配的副把手仅提供辅助握持功能，在钻类工具上也无其他可用于定位钻孔位置的装置。当使用者需要以某个参照物为基准进行钻孔时，只能手工在工作面上用尺、笔并借助于水平或垂直指示器等工具相对于所确定的参照物画出钻孔点后再工作，且当参照物的距离较远时，其准确度很难得到保证。

发明内容

本实有新型的目的是提供一种带激光定位标尺的用于钻类工具的副把手，现有的钻类工具上用于安装副把手的颈部的外圆是标准直径的，副把手上的开口环的内孔直径可通过一锁紧装置来调节，这样，当放松锁紧装置时，开口环张大，可将副把手安装到钻类工具的颈部上并可以相对于钻类工具主体旋转、或从工具上拆下来；收紧该锁紧装置则可使副把手固定在钻类工具上以适应不同钻孔位置时的舒适握持的需要。本发明的要点是在这种通用型副把手上设计安装一个激光定位装置，副把手的原有功能不受影响。该激光定位装置可以通过发射孔发出一束扇面

光，该扇面光束射到一物体表面上时形成一条可视直线，由于所述副把手可以在钻类工具上旋转，当操作者需要以任意两点或一条线或一个面为基准钻一排孔时，只要旋转并固定副把手，使该激光线与这些确定的点、线或面重叠，就可以快速准确地确定钻孔点，直接进行钻孔工作。本实用新型中的带激光定位标尺的副把手包括一个用于握持的手柄，一开口环，一用于锁紧或放松所述开口环的锁紧装置，该锁紧装置可以是一副螺栓及螺母，在所述副把手上装有一第一激光发生器、一用于为第一激光发生器提供动力源的电池组，一用于控制第一激光发生器的开关；所述激光发生器可以包含一外壳，一激光二极管，一将激光二极管发出的光源聚焦并最终发散为一个扇面光束的透镜组，在光束射出方向的外壳上有一与扇面光束对齐的细长发射孔。副把手装在钻类工具上时，按下控制开关，激光发生器通过发射孔向发射孔的前方发出一束扇面光，激光束的扇面与副把手的中心轴线平行，且与钻夹头亦即钻头的中心轴线在一个平面内，当考虑到左、右手操作者而使副把手的中心轴线与钻头的中心轴线在一个平面内时，激光束的扇面与副把手的轴线在一个平面内。

本实用新型的另一个目的是确保精确定位。当需要相对于某一参照点、线或面进行与该参照点水平、垂直或成 45 度角的钻孔时，为了更精确地保证与该参照点水平，垂直或 45 度，所述副把手上还可以有选择地安装有与扇形激光束成平行、垂直或 45 度角的水平泡，这些不同角度的水平泡或一个或两两组合或三个同时安装在副把手上。这样，利用激光发生器在被加工面上形成的直线，并配合固定在副把手上的与激光束平

行、垂直、45 度角等方向上的用于指示发出的激光束相对于水平面的位置的水平泡，可准确定位与参考点、线处于同一铅垂线、水平线或 45 度角直线上的钻孔点。

此外，本还有实用新型还有一个目的，是同时以两个目标为参照。在本实用新型中，还可以在所述副把手的开口环上装一个子把手，所述子把手带一个与第一激光发生器类似的第二激光发生器，第二激光发生器亦共用副把手中的第一激光发生器的电池组作为电源，其启动与断开也由副把手上的用于控制第一激光发生器的开关同时控制。子把手的中心轴线可通过钻夹头的中心，第二激光发生器向前方发出的一束扇面光，与子把手的中心轴线平行或在一个面内，且与钻夹头亦即钻头的中心轴线在一个面内。这样，副把手上与子把手上的第一和第二激光发生器发出的两扇面光束在被加工件的表面所形成的两条线的交点即与钻夹头的中心点亦即钻头重叠，子把手与副把手之间的夹角即确定了在被加工件的表面形成的两条直线之间的夹角。所述子把手与所述副把手之间可以是固定垂直的。所述副把手的开口环上的用于定位子把手的方式也可以是一个沿外圆面的弧状凹槽，这样，所述子把手与所述副把手之间的夹角可根据实际使用的需要在一定范围内调节，一般选择角度为 45 度至 180 度，并可以在所述开口环上靠近子把手的地方相对于第一激光发生器发出的扇形光束面成 45 度、90 度、135 度和 180 度处打上刻度。这样就可以以任意两点为参照，通过调节副把手及副把手上的子把手与副把手之间的夹角，形成一个所需的交点即钻孔点。

在子把手上也可以分别或同时装上指示激光束水平、垂直或其他角

度的水平泡，用于指示子把手上发出的激光束与水平面之间的位置，这样，同时利用副把手与子把手上的各个角度的水平泡可以在一个非水平面上更精确地定位一个与一个参考点连成水平线，与另一个参考点连成铅垂线或45度线的钻孔点。

本实用新型还有一个目的是使子把手上的激光发生器的发射方向向着钻类工具的后部，从而在钻孔时以操作者背后的目标为对齐的参照物。

附图说明：

图1为体现本实用新型的带激光定位标尺的副把手的正面结构示意图；

图2为图1所示的带激光定位标尺的副把手的右示图；

图2A为副把手中的激光发生器的原理示意图；

图3为装有各个角度的水平泡的带激光定位标尺的副把手的反面视图；

图4为图1所示的带激光定位标尺的副把手装在一钻类工具上的示意图；

图5为装有子把手的带激光定位标尺的副把手的正面结构示意图；

图6为图5所示的带激光定位标尺的副把手的右示图；

图7为图5所示的带激光定位标尺的副把手的后视图；

图8为子把手与副把手成90度夹角装在钻类工具上时的示意图；

图9为子把手与副把手之间夹角为180时装在一钻类工具上的示意图；

图10为将图8中副把手旋转90度后的结构示意图；

图11为子把手上激光发生器向钻类工具后部发射激光束的结构示意图；

图12 为子把手向后仰时的结构示意图。

具体实施方式

如图1至图3所示，本实用新型所述的可装在钻类工具101上的用

于定位钻类工具 101 的钻孔点的副把手 41，包含用于握持的手柄 1，用于安装在钻类工具 101 的颈部的开口环 2，用于放松或锁紧开口环 2 的一锁紧装置 3，该副把手 41 还包含一位于副把手 41 的正面 412 中的一第一激光发生器 6、用于开启或关断第一激光发生器 6 的开关 7、给激光发生器提供电源的电池组 8，紧固装置 3 可以由一螺栓 31 及螺母 32 组成。为了同时适合于左手握持及右手握持，开口环 2 被紧固在钻类工具 101 上时，该副把手 41 的中心轴线 411 可与开口环 2 的中心轴线 412 在一个平面内，也即与钻类工具 101 的钻夹头 102 的中心轴线 103 在同一平面内。放松紧固装置 3，可以将所述副把手 41 从钻类工具上拆下来或使所述副把手 41 在钻类工具 101 上旋转，锁紧紧固装置 3，则可将所述副把手 41 固定在钻类工具 101 的颈部。如图 2A 所示，激光发生器 6 包含一壳体 65，一激光二极管 61，将激光二极管 61 所发出的散光源聚焦并转换发散为一扇面光束 64 的一组透镜 63，壳体 65 上有一使扇面光束 64 通过的细长孔 66。如图 4 所示，扇面光束 64 通过钻类工具 101 的钻夹头 102 的中心轴线 103，并在被加工件 201 的表面 202 上形成一条线段 641，从而可以参照点 A1 确定钻孔位置。

在图 1 所示的副把手 41 的背面 413，亦即装在钻类工具 101 上时面对操作者的一面上可以单独安装一个水平泡，其与所述扇面光束 64 或平行或垂直或成 45 度角，分别如图 3 中的水平泡 91，92 及 93 所示，该三种位置的水平泡亦可两两组合或同时安装在所述的副把手 41 上。图 3 所示即为背面 413 上同时装有三个位置的水平泡 91，92 及 93 的副把手 41 的示意图。当用钻类工具 101 在垂直于水平面的墙面上钻孔时，可根

据相应的水平泡调整钻类工具 101，亦即调整照射在墙面上的激光线 641 的位置，从而准确定位与参考点处于同一铅垂线、水平线或 45 度角的钻孔点。

如图 5 所示，在所述的副把手 41 上还可以装一个中心轴线 421 与副把手 41 的中心轴线 411 垂直的子把手 42，所述中心轴线 421 可以与开口环 2 的中心轴线 412 相交。在所述子把手 42 上亦装有一与第一激光发生器 6 相同的第二激光发生器 6'，共用电池组 8 作为电源，其启动与断开也由控制第一激光发生器 6 的开关 7 进行控制，所述第二激光发生器 6' 发出的扇面光束 64'通过钻类工具 101 的钻夹头 102 的中心轴线 103。这样，副把手 41 与子把手 42 上的第一和第二激光发生器 6，6'发出的两扇面光束 64，64'在被加工件 201 的表面 202 上所形成的两条线 641,642 相互垂直，线段 641，642 的交点即与钻头 104 重叠，如图 8 所示。

所述子把手 42 与副把手 41 之间的夹角最好可以调节，如图 6 所示，所述副把手 41 上的开口环 2 上用于定位子把手的方式可以是一个沿外圆面的弧状凹槽 21，这样，所述中心轴线 411，421 之间的夹角可根据实际使用的需要在一定范围内调节，一般选择角度调节范围使得两条激光线 641，642 之间的夹角为 45 度至 180 度，并可以在所述开口环 2 上靠近子把手的地方相对于第一激光发生器发出的扇形光束面成 45 度、90 度、135 度和 180 度处打上刻度。

如图 7 所示，子把手 42 上也可以分别或同时装上与扇面激光束 64' 水平、垂直的水平泡 91'，92'，分别用于指示垂直面上激光线 642 与水平面之间的位置。

这样，同时利用副把手 41 与子把手 42 上的各个角度的水平泡可以在一个非水平面上更精确地定位一个与一个参考点连成水平线，与另一个参考点连成铅垂线或 45 度线的钻孔点。

如图 4 所示，对于如图 1 所示的副把手 41，使用时，按下开关 7，激光发生器 6 产生一条通过钻类工具 101 的钻夹头 102 的中心轴线 103 的扇面光束 64 并在工作面 202 上形成线段 641，调整副把手位置使激光束 64 处于大致垂直位置并轻微调整握持，使水平泡 92 指示水平位置，即激光为线 641 成铅垂线，同时将光束的一端对准参照点，即可在与参照点 A1 处于同一铅垂线的点上钻孔了。

使用者可任意转动副把手 41，使把手与工具成一利于握持的角度，同时使激光束 64 处于大致水平的位置，轻微调整握持，使水平泡 91 指示水平，即激光线 641 为水平线，将激光线 641 的一端对准参照点，即可在与参照点处于同一水平位置的点上钻孔了。

当参照物自身即为一直线时，使用者仅需将激光束与参照线对齐，即可准确找到所需要的钻孔点进行钻孔了。

类似的，当在把手上装上了与轴线成其他角度的水平泡，还可以利用这些角度上的参考点来定位钻孔点。

对于如图 5 所示的带子把手 42 的副把手 41，如图 8 所示，当子把手 42 与副把手 41 垂直时，将副把手 41 及子把手 42 上的第一及第二激光发生器 6,6'产生的激光线 641,642 分别对准第一和第二参照点 A1,A2，即可以用两条相互垂直的激光线 641，642 的交点来定位钻孔点。如图 9 至图 10 所示，可以调整副把手 41 相对于钻类工具 101 的位置及子把手

42 相对于副把手 41 的位置从而产生不同的组合来定位钻孔点。

如图 11 所示，上述子把手 42 除可在副把手 41 上移动外，子把手 42 的安装方式使得其可以被拆下来掉转 180 度后反向安装在副把手 41 上，或采用一个万向节 422（图中未显示）使子把手 42 可以绕自己的中心轴线旋转 180 度。此外，如图 12 所示，还可以做成子把手 42 可以以激光束 64'的发射方向为前面向后仰，以扩展激光束的发射距离，当仰角为 90 度时，与钻类工具 101 的钻夹头 102 的中心轴线 103 平行。当一个参照点线不在被加工面上且其与待钻孔点的距离相距较远，激光束无法达到时，首先确定子把手 42 与副把手 41 在一个平面内时两者之间的夹角，并固定，然后可以把子把手 42 调整到所需要的位置。例如，在一个垂直墙面上钻孔时，可以以该墙面上的一点为参考点，调节子把手 42 的位置，就可以以另三面墙壁或天花板或地面上的任一点为另一参考点来定位希望的钻孔点。

当然，利用激光帮助定位钻孔点的副把手还可采用其它结构而不脱离本发明的范围。例如在副把手上再增加一个或多个带激光发生器的子把手等，均属于本发明的保护范围。

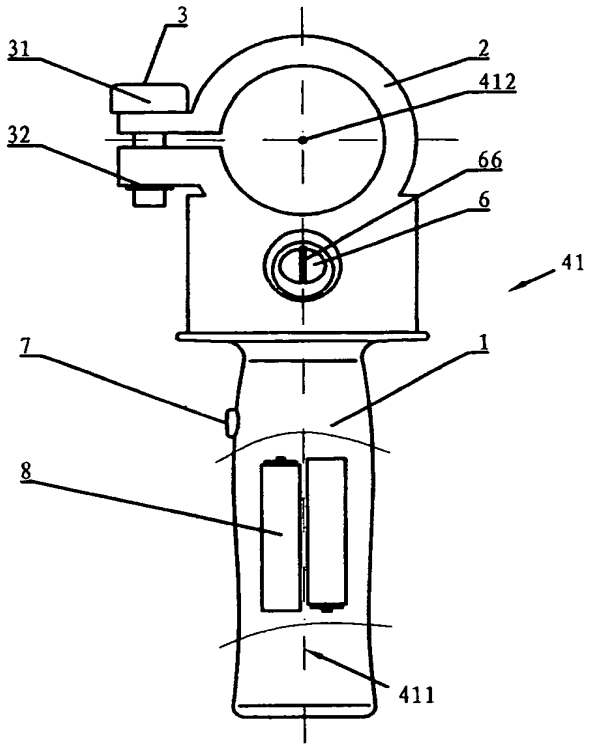

图1

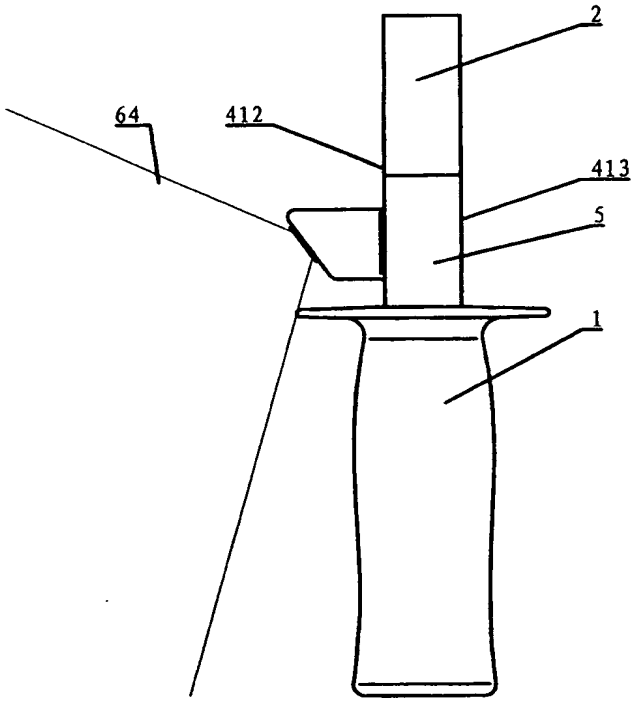

图2

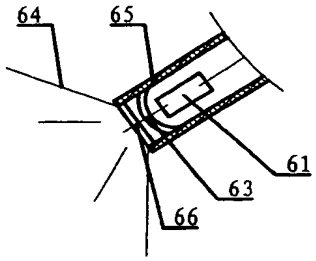

图2A

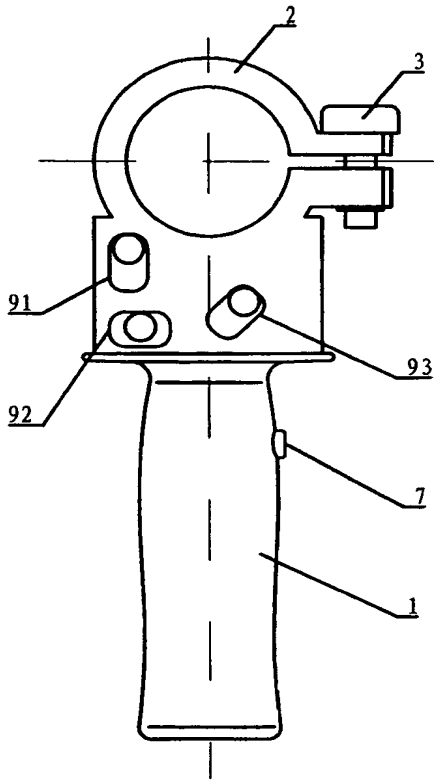

图3

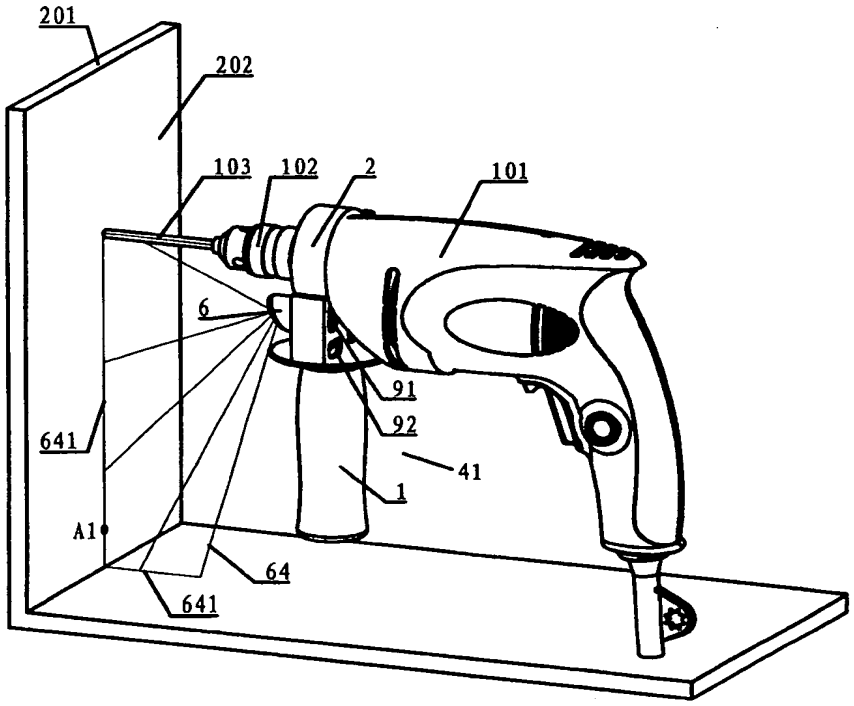

图4

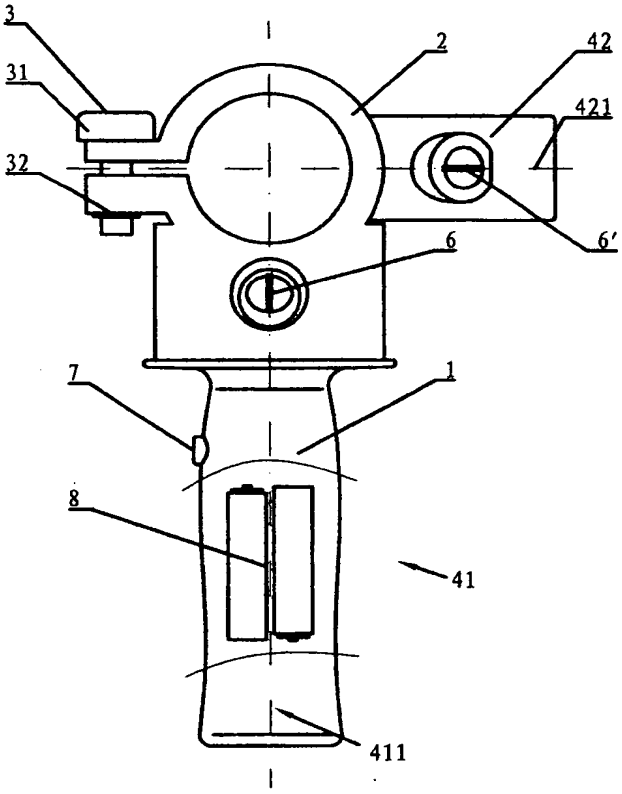

图5

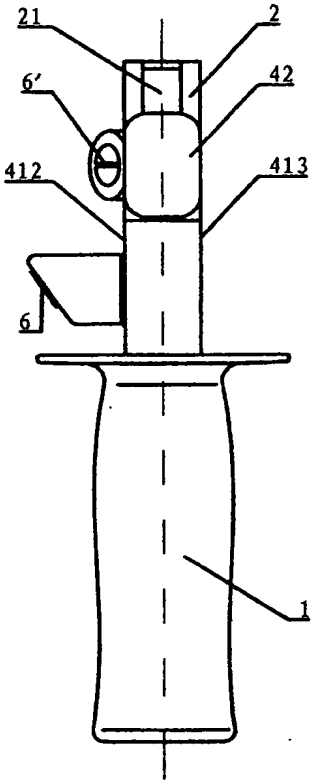

图6

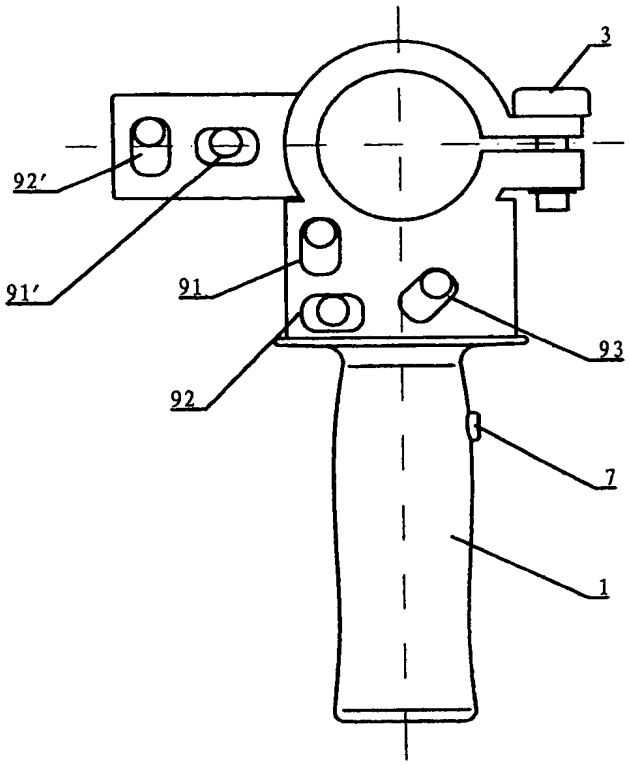

图7

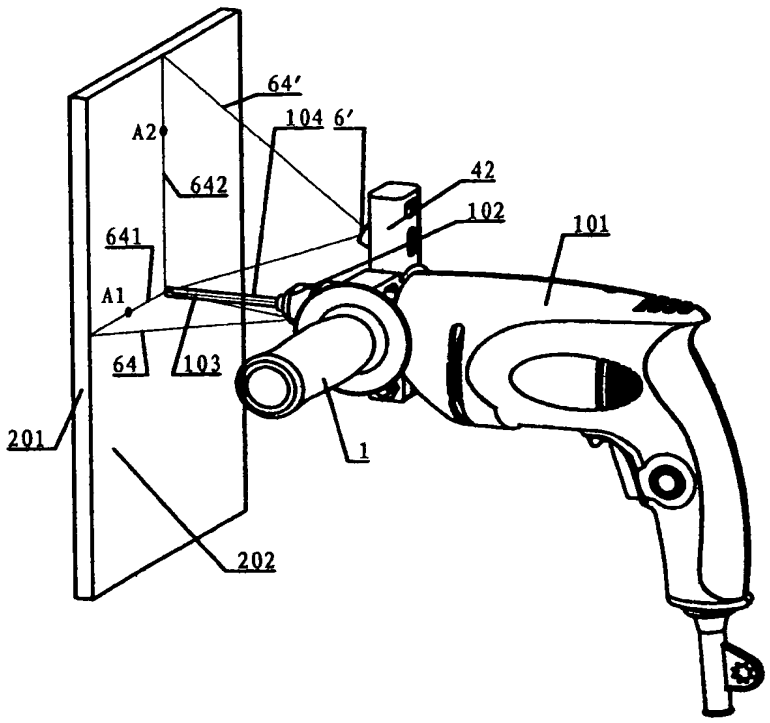

图8

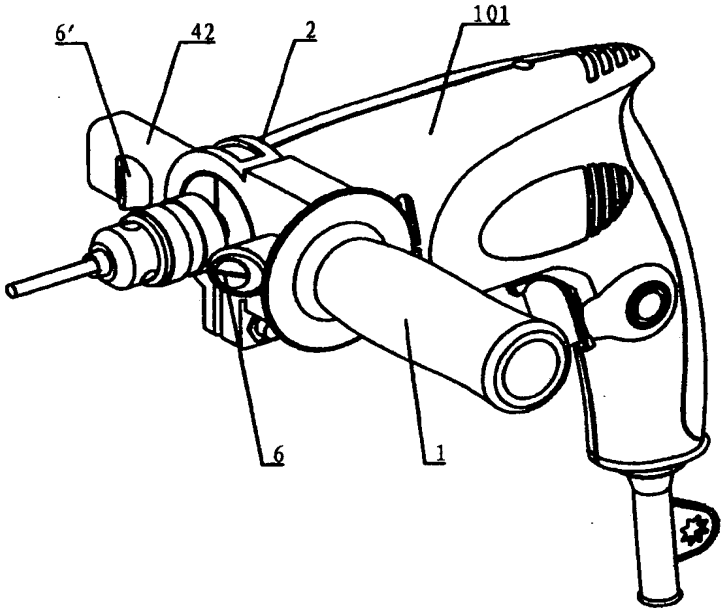

图9

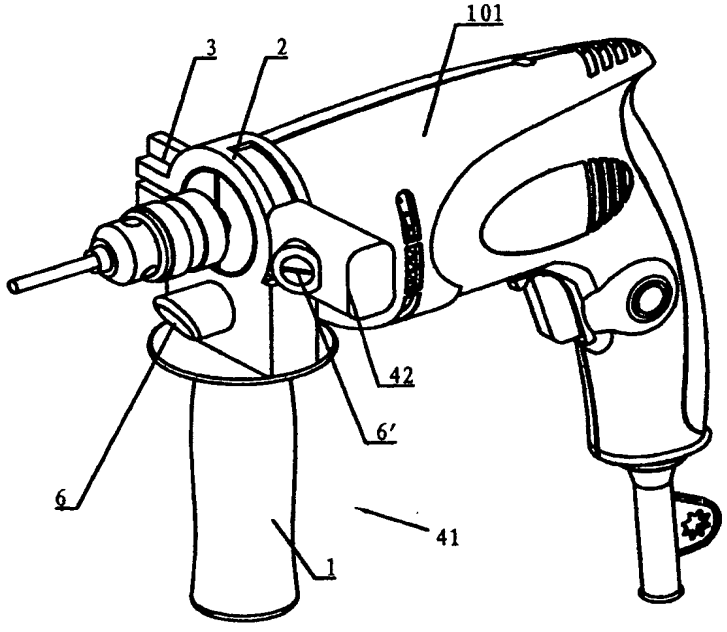

图10

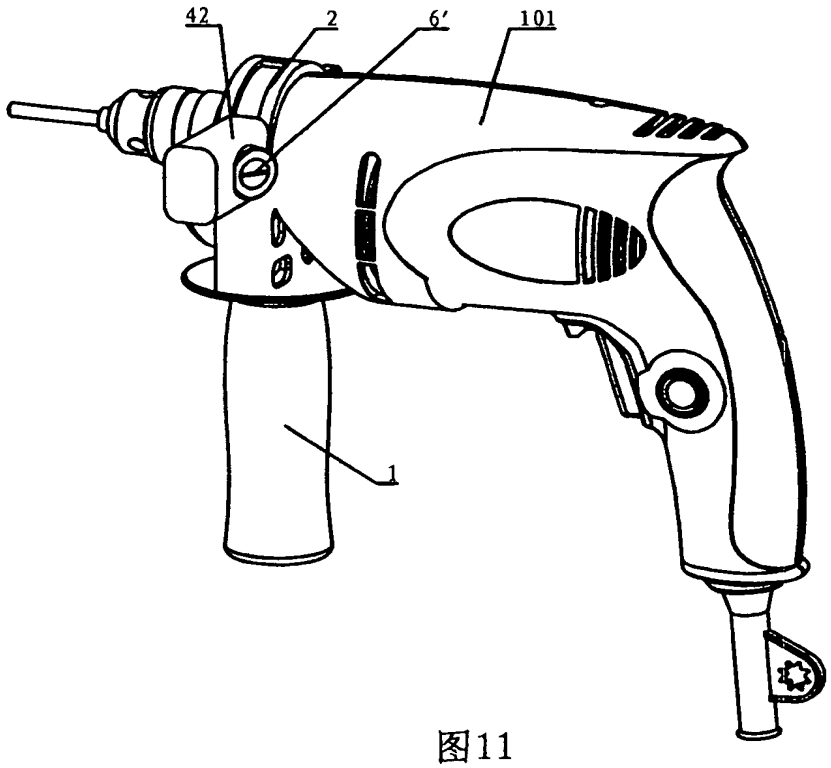

图11

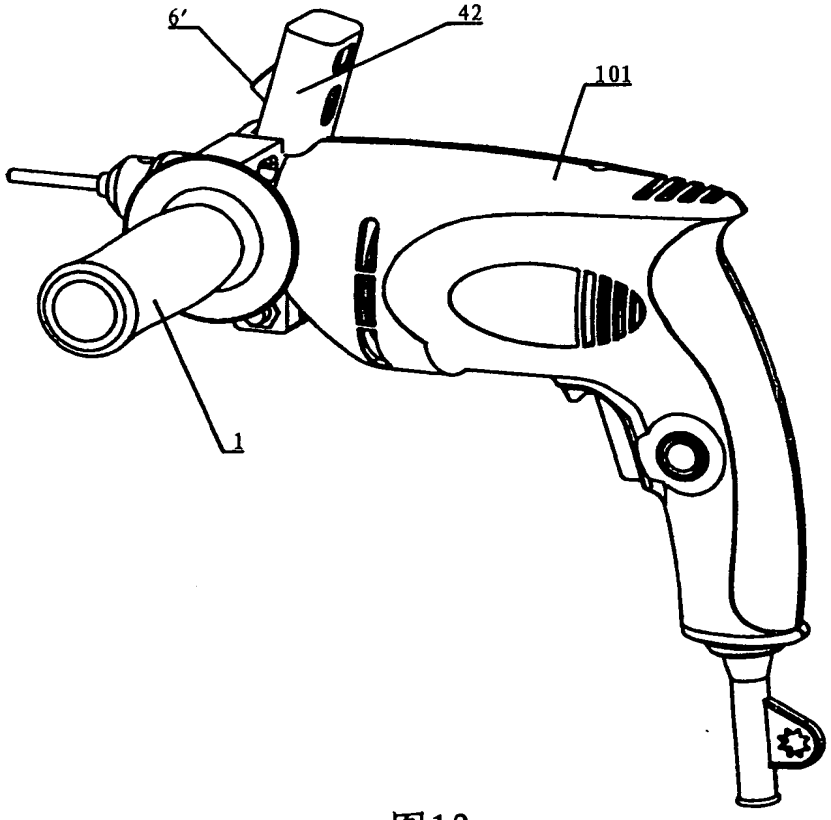

图12